

***Synchronizing to audio tape  
(Beat sync and 50 Hz)***

SO-05-0790

## ***Synchronizing a sequence to an external source***

You can synchronize a sequence, cue list or Direct-to-Disk project to an external source using external synchronization modes other than SMPTE.

*50 Hz signal with 10 ms duty cycle*

*Beat sync signal, click rate multiplier = 1*

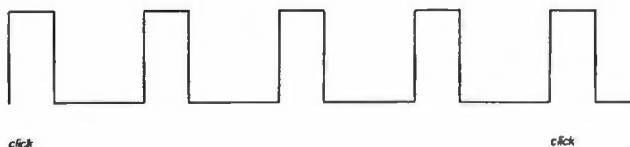
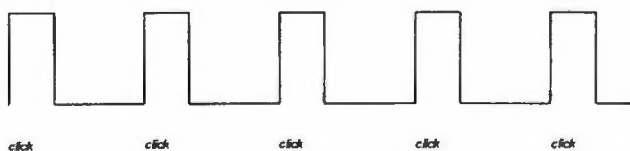
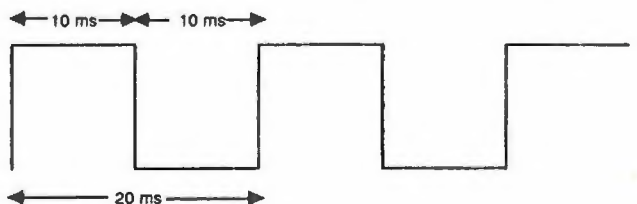
*Beat sync signal, click rate multiplier = 4*

## ***The 50 Hz and beat sync modes***

The sequencer is normally set to the internal synchronization mode. Two modes are available for synchronizing the current sequence to audio tape.

- The **50 Hz mode** synchronizes the sequence to a series of pulses at a frequency of 50 pulses per second. Each pulse is 10 milliseconds wide.
- The **beat sync mode** synchronizes the sequence to a pulse with a frequency determined by the current click rate and click rate multiplier settings. Each pulse is 15 milliseconds wide.

You can generate either of these signals for recording into the sync track of a multitrack tape recorder. You can then feed the taped signal back into the Synclavier and record a sequence synchronized to the tape recorder.



## ***5.2 Studio operations***

## *Generating and conditioning sync signals*

The selected pulse (beat sync or 50 Hz) is automatically generated at the EXTERNAL CLOCK OUT jack on the control unit whenever START is pressed. The outgoing signal, DC voltage being switched on and off, cannot be recorded onto tape accurately since a tape recorder records only the beginning of the pulse accurately and distorts each pulse as its on or off state continues. The distorted taped signal is not a reliable signal for synchronization.

Fedding the signals through a pulse conditioner encodes them as FSK (frequency shift key) signals. FSK signals recorded on tape can then be decoded to produce reliable sync pulses suitable for using with the Synclavier.

## *Receiving external synchronization signals*

The pulse signals received through the EXTERNAL CLOCK IN jack are automatically conditioned by a signal conditioner built into the jack.

- When a 50 Hz signal is received, the sequence moves forward at a steady rate. While using 50 Hz synchronization, you can make changes in the speed, click rate and click rate multiplier settings just as you would when the sync mode is set to internal sync.
- When a beat sync signal is received, the sequence advances one click or click rate division, depending on the click rate and click rate multiplier settings. While using beat synchronization, you should not make changes in the speed, click rate or click rate multiplier settings. Changes in speed affect only notes recorded between click subdivisions; changes in click rate and click rate multiplier settings affect only notes recorded on the click or its subdivisions.

**Note:** When using the beat sync mode, the rate of the beat sync pulse should match the click rate of the sequence being synchronized. If it does not, each incoming pulse may trigger several notes simultaneously or none at all.

## ***Sync-to-tape***

When you synchronize the system to tape, you need tape machines capable of recording and playing tracks independently. Three-head machines must have a sync mode which allows the use of the RECORD head as a PLAY head.

## ***Synchronization overview***

Synchronizing the Synclavier to audio recorded on tape can be done from either the Sequence Editor or, if you have a Synclavier keyboard, the keyboard control panel. Each step of the procedure outlined below is discussed in detail further on.

1. Select the 50 Hz or beat sync synchronization mode by pressing EXT SYNC MODE once or twice.

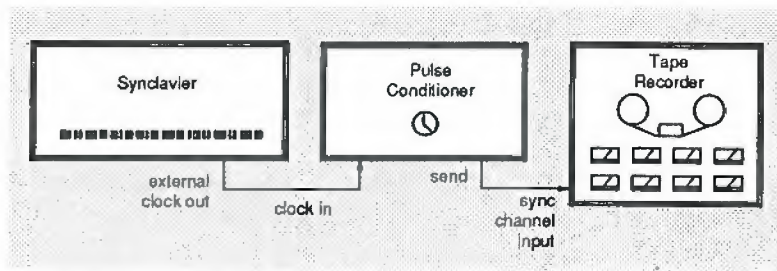
The selected mode determines the signal produced at the EXTERNAL SYNC OUT jack.

2. Connect the EXTERNAL SYNC OUT jack through a pulse conditioner to the sync input channel of the tape recorder.
3. Record a sync track on tape that is as long as the sequence you want to synchronize.
4. Feed the sync channel output of the tape recorder into the EXTERNAL CLOCK IN jack on the Synclavier.
5. Press RECORD.

The sequencer waits for the incoming sync signal.

6. Start the tape recorder.

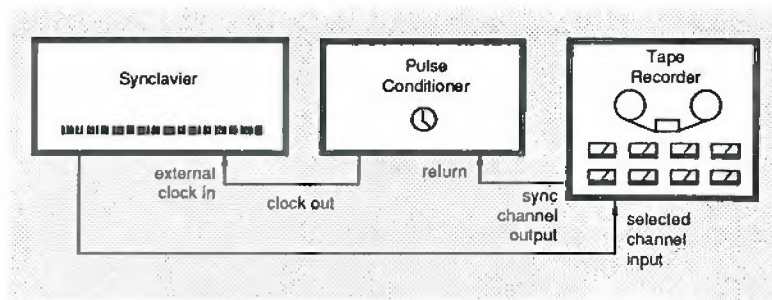
As soon as the signal is received at the EXTERNAL CLOCK IN, the digital metronome begins and you can start recording. When the external signal stops, the sequence stops.



### Setup

#### Recording a sync track on tape

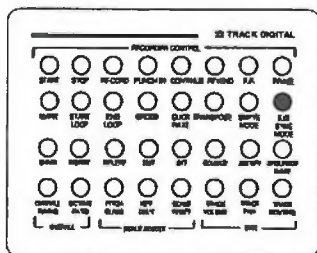
- Synclavier EXTERNAL CLOCK OUT to the pulse conditioner CLOCK IN.
- pulse conditioner SEND to TAPE INPUT of the sync track channel.
- Tape recorder sync track channel set to record mode.



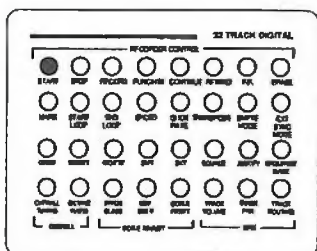
#### Recording Synclavier tracks synchronized to tape

- Synclavier audio output(s) to tape recorder selected channel input(s). If the selected timbre is a stereo timbre you will need two tracks to record the stereo information.
- Tape recorder sync track output to FSK decoder input.
- FSK decoder clock output to Synclavier EXTERNAL CLOCK IN.

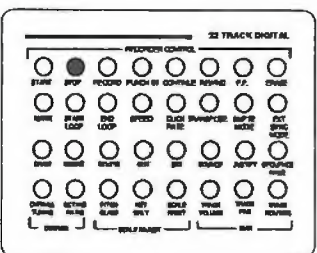
## Sync-to-tape (con't)



EXT SYNC MODE  
panel 2



START  
panel 2



STOP  
panel 2

## Recording a 50 Hz signal onto tape

1. Set up the tape recorder or other pulse conditioner and the Synclavier as described above. To listen to the playback, send the sync pulse to the EXTERNAL CLOCK IN jack.

2. Press the EXT SYNC MODE button once to select the 50 Hz mode.

The button lights.

3. Press START on the control panel.

A steady 50 Hz signal is sent from the EXTERNAL CLOCK OUT through the pulse conditioner to the sync channel input on the tape recorder. If there is a sequence in the sequencer, it does not start to play.

4. Set the recording level on the tape recorder low enough so that the signal does not bleed onto other tracks (usually -5 to -10 dBvu).

5. Press STOP on the control panel.

6. Start the tape in the record mode.

7. Let the tape get up to speed, allow the low FSK tone to record for 5 seconds, and then press START on the control panel.

The 50 Hz pulse is encoded in FSK on the tape track as long as the sequencer is running. Continue recording until sufficient signal is recorded for the entire sequence to be synchronized.

8. Press STOP on the control panel.

9. Stop the tape recorder and rewind the tape to the zero point.

## 5.6 Studio operations



## Recording a beat sync pulse onto tape

1. Set up the tape recorder or other pulse conditioner, and the Synclavier as described above. To listen to the playback, send the sync pulse to the Synclavier EXTERNAL CLOCK IN.

2. Press the EXT SYNC MODE button twice to select the external beat sync mode.

The button blinks.

3. Press START on the control panel.

Beat sync pulses with a frequency equal to the click rate of the sequence (or the click rate times the click rate multiplier, if used) are sent from the EXTERNAL CLOCK OUT through the pulse conditioner to the sync channel input of the tape recorder.

4. Set the recording level on the tape recorder low enough so that the signal does not bleed onto other tracks (usually -5 to -10 dBvu).

5. Press STOP on the control panel.

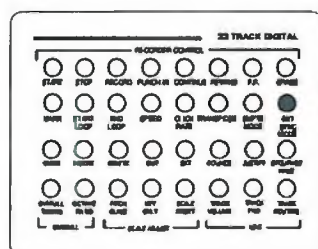
6. Start the tape in the record mode.

7. Let the tape get up to speed, allow the low FSK tone to record for 5 seconds, then press START on the control panel.

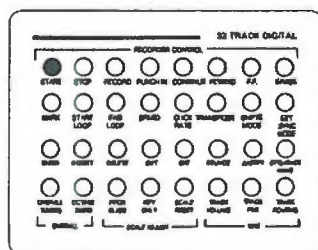
The beat sync pulses are recorded on tape as long as the tape and sequencer are running. Record enough tape for the entire sequence to be synchronized.

8. Press STOP on the control panel.

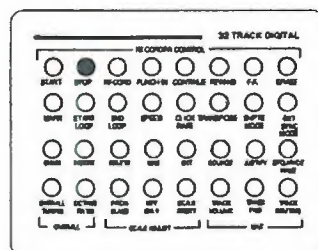
9. Stop the tape recorder and rewind the tape.



EXT SYNC MODE  
panel 2

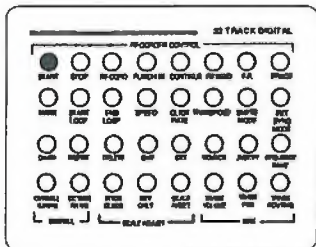


START  
panel 2



STOP  
panel 2

## Sync-to-tape (con't)



START  
panel 2

## Playing back a sequence synchronized to tape

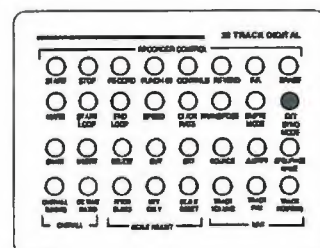
1. Connect the recorded sync track output through the FSK decoder to the EXTERNAL CLOCK IN jack on the signal processor.
2. Place the sync track's channel in the sync mode when recording on tape or the play mode for final playback and mixing.
3. Press START on the control panel and play the tape.

Adjust the FSK decoder for adequate input trigger level. The sequence begins playing when the sync track reaches the encoded sync signal (50 Hz or beat sync).

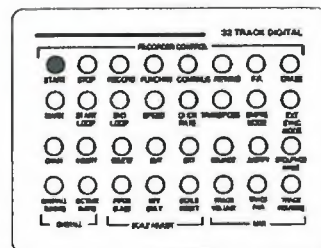


### Recording Synclavier tracks to tape

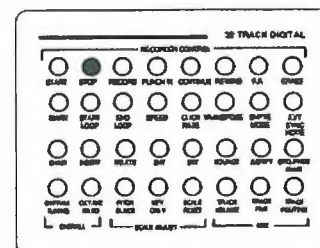
1. Place the tape recorder in **sync mode** and the selected input track(s) in the input mode. Make sure the tape is rewound to a point prior to the beginning of the low FSK tone.
2. Select the **internal sync mode** (unlit) with the EXT SYNC MODE button.
3. Solo the track to be recorded, press **START** on the control panel and set the recording level(s) on the tape recorder.
4. Press **STOP** on the control panel.
5. Press the **EXT SYNC MODE** button once or twice to select the appropriate **external sync mode** (50 Hz or beat sync).
6. Start recording on the selected channel.
7. Watch the **VU meter** of the sync track. When the low FSK tone begins, press **START** on the control panel.
8. When the sequence is finished playing, stop the tape recorder and press **STOP** on the control panel.



EXT SYNC MODE  
panel 2



START  
panel 2



STOP  
panel 2

## Two systems in sync

When one system is in sync with another system, one system acts as a master and one as a slave.

## Synchronizing to high speed clock signals

Many sequencers and drum machines generate a high speed clock signal. This signal is usually a multiple of the click rate and is defined in pulses per quarter note. Common time bases are 12, 24, 48 or 96 pulses per quarter note beat.

When synchronized to the Synclavier, such systems must be set up as the master system. The sync signal from the system must be divided using a pulse divider.

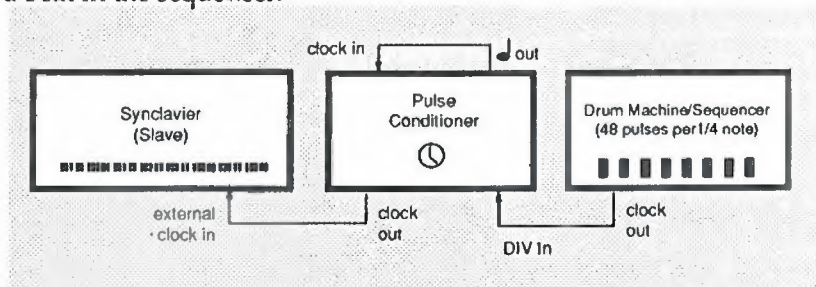
The following instructions describe synchronization to a system using a pulse rate of 48 pulses per quarter note.

To play or record a sequence synchronized to a drum machine or sequencer

1. Place the Synclavier in the beat sync mode by pressing EXT SYNC MODE twice to make it blink.
2. Press START.
3. Start the drum machine or sequencer.

Each beat of the sequence in the drum machine or sequencer triggers a beat in the sequencer.

### Setup: Synclavier and drum machine



- Drum machine or sequencer time base output to pulse divider input.
- Pulse divider 1/48 output to Synclavier EXTERNAL CLOCK IN.

## Synchronizing two sequencer systems

1. Select the appropriate 50 Hz sync mode on both the slave system and the master system.

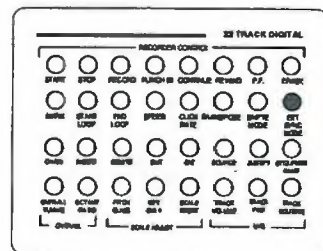
2. Start the slave system.

It does not play.

3. Start the master system.

When you start the slave system, it waits for an external signal. When you start the master system, it emits a sync signal through its clock output. The systems play in synchronization.

When one of the two systems is a Synclavier, new tracks may be recorded in the sequencer while the systems are synchronized. The new tracks are automatically synchronized to the original sequence.



EXT SYNC MODE  
panel 2

